Contents Volume 127, January 1990

SPECIAL ISSUE
ON LINEAR ALGEBRA AND STATISTICS

Special Editors: Michael D. Perlman, Friedrich Pukelsheim, and George P. H. Styan

PREFACE 1

R. B. BAPAT (New Delhi, India)
Permanents in Probability and Statistics 3

R. DAHLHAUS (Heidelberg, West Germany)
Approximations for the Inverse of Toeplitz Matrices with Applications to Stationary Processes 27

G. TSAKLIDIS AND P.-C. G. VASSILIOU (Thessaloniki, Greece)
Infinite Products of Matrices with Some Negative Elements and Row Sums Equal to One 41

OLAF KRAFFT AND MARTIN SCHAEFER
(Technical University, Aachen, West Germany)
Convergence of the Powers of a Circulant Stochastic Matrix 59

JEFFREY J. HUNTER (Auckland, New Zealand)
Parametric Forms for Generalized Inverses of Markovian Kernels and Their Applications 71

NANCY FLOURNOY (Washington, D.C.)
Dependency in Multivariate Markov Chains 85

A. G. M. STEERNEMAN (Groningen, The Netherlands)
G-Majorization, Group Induced Cone Orderings, and Reflection Groups 107

A. M. DEAN AND J. S. VERDUCCI (Columbus, Ohio)
Linear Transformations That Preserve Majorization, Schur Concavity, and Exchangeability 121

ALESSANDRA GIOVAGNOLI (Perugia, Italy)
AND MARIO ROMANAZZI (Venice, Italy)
A Group Majorization Ordering for Correlation Matrices 139

JERZY K. BAKSALARY (Zielona Góra, Poland)
AND JAN HAUKE (Poznań, Poland)
A Further Algebraic Version of Cochran's Theorem and Matrix Partial Orderings 157

Table of Contents continued

JERZY K. BAKSALARY (Zielona Góra, Poland),
KENNETH NORDSTRÖM (Helsinki, Finland), AND
GEORGE P. H. STYAN (MONTRÉAL, QUÉBEC)
Löwner-Ordering Antitonicity of Generalized Inverses
of Hermitian Matrices 171

R. A. BAILEY (Harpenden, U.K.) AND C. A. ROWLEY
(Milton Keynes, U.K.)
General Balance and Treatment Permutations 183

ANDRÉ KOBILINSKY (Versailles, France)
Complex Linear Models and Cyclic Designs 227

J. N. SRIVASTAVA AND DIANE THROOP (Fort Collins, Colorado)
Orthogonal Arrays Obtainable as Solutions
to Linear Equations over Finite Fields 283

J. LAUTERBACH (Hannover, West Germany)
AND P. STAHLECKER (Mainz, West Germany)
Some Properties of $[\mathrm{tr}(Q^{2p})]^{1/2p}$ with Application
to Linear Minimax Estimation 301

DOUGLAS P. WIENS (Edmonton, Canada)
Robust Minimax Designs for Multiple Linear Regression 327

KENNETH NORDSTRÖM (Helsinki, Finland)
AND JOHAN FELLMAN (Helsinki, Finland)
Characterizations and Dispersion-Matrix Robustness
of Efficiently Estimable Parametric Functionals
in Linear Models with Nuisance Parameters 341

JERZY K. BAKSALARY (Zielona Góra, Poland)
AND SIMO PUNTANEN (Tampere, Finland)
Characterizations of the Best Linear Unbiased Estimator
in the General Gauss-Markov Model with the Use
of Matrix Partial Orderings 363

JERZY K. BAKSALARY AND PAWEŁ R. PORDZIK (Poznań, Poland)
A Note on Comparing the Unrestricted and Restricted
Least-Squares Estimators 371

HANS JOACHIM WERNER (Bonn, West Germany)
On Inequality Constrained Generalized Least-Squares
Estimation 379

JERZY K. BAKSALARY (Zielona Góra, Poland)
AND THOMAS MATHEW (Baltimore, Maryland)
Rank Invariance Criterion and Its Application
to the Unified Theory of Least Squares 393

Table of Contents continued

Douglas M. Hawkins (St. Paul, Minnesota) and Dan Bradu (Pretoria, South Africa)
Application of the Moore-Penrose Inverse of a Data Matrix in Multiple Regression 403

A. J. Scott (Auckland, New Zealand), J. N. K. Rao (Ottawa, Canada) and D. Roland Thomas (Ottawa, Canada)
Weighted Least-Squared and Quasilikelihood Estimation for Categorical Data under Singular Models 427

F. R. de Hoog (Canberra, Australia), T. P. Speed (Berkeley, CA), and E. R. Williams (Canberra, Australia)
On a Matrix Identity Associated with Generalized Least Squares 449

Dietrich von Rosen (Stockholm, Sweden)
A Matrix Formula for Testing Linear Hypotheses in Linear Models 457

J. H. Randall (Stellenbosch, South Africa) and A. A. Rayner (Pietermaritzburg, South Africa)
The Accuracy of Least Squares Calculations with the Cholesky Algorithm 463

Ching-Shui Cheng (Berkeley, California) and Ker-Chau Li (Los Angeles, California)
Characterization of Invariant Spaces under a Symmetric Real Matrix and Its Permutations 503

Chi Song Wong (Windsor, Canada)
Extensions of $\operatorname{tr}[(A^{-1} - B^{-1})(A - B)] \leqslant 0$ for Covariance Matrices A, B 517

Yasuo Amemiya (Ames, Iowa)
On the Convergence of the Ordered Roots of a Sequence of Determinantal Equations 531

Harold V. Henderson (Hamilton, New Zealand) and Shayle R. Searle (Ithaca, New York)
Generalized Dispersion Matrices for Covariance Structural Analysis 543

A. Shapiro and M. W. Browne (Pretoria, South Africa)
On the Treatment of Correlation Structures as Covariance Structures 567

Table of Contents continued

H. Neudecker (Amsterdam, The Netherlands)
and A. M. Wesselman (Utrecht, The Netherlands)
The Asymptotic Variance Matrix of the Sample Correlation Matrix 589

Mara Lee McLaren (Ottawa, Canada)
Asymptotic Results for Decomposing a Likelihood-Ratio Statistic into Separate Components 601

H. Nanda (NIE, India) and I. Olkin (Stanford, California)
Matrix Properties of an Interbattery Factor Analytic Model 617

Tom Wansbeek and Jaap Verhees
(Groningen, The Netherlands)
The Algebra of Multimode Factor Analysis 631

U. Kamps (Aachen, West Germany)
Relative Efficiency of Estimates and the Use of Chebyshev Polynomials in a Model of Pairwise Overlapping Samples 641

Author Index 655